

Description

[Radio Controlled Aquatic Propulsion Device]

BACKGROUND OF INVENTION

[0001] The present invention relates generally to aquatic propulsion devices and, more particularly, to a self-contained, removable, radio controlled aquatic propulsion device, which may be used with a variety of floating toys, water-fowl decoys, aquatic novelty items and small boats.

[0002] A number of prior art devices exist, which include means to propel various objects through the water. A wide variety of radio controlled aquatic toys have been developed over the years. Many pertain specifically to single purpose toys with permanent electronics and drive systems. Such toys, while occasionally novel in design, can be expensive and the design specific nature, can lead to boredom with the toy. In addition, if the superstructure of the toy is damaged because of neglect, abuse or poor construction, the entire toy may be rendered unusable. As such, the toy

industry has suffered from limited interest in this type of toy.

[0003] Several designs have been developed that separate the drive mechanism from the buoyant body of aquatic toys. U.S. Patent No. 3,418,751, issued Dec. 31, 1968 to T. Mabuchi shows a toy motor drive unit that can be mounted to the bottom of various aquatic toys. The device, however, is limited by the fact that it only propels the aquatic toy in one direction. While the direction is adjustable by a rudder, it is not controllable by the operator once deployed. U.S. Patent No. 3,824,735, issued July 23, 1974 to H. Brandstätter, shows a toy boat with a separate compartment for a battery and motor. Again, this does not provide for remote, full-motion control of the aquatic toy. U.S. Patent No. 4,732,049, issued Mar. 22, 1988 to J. Beny, K. Meggs, M. Filoseta and E. Feris, discloses a removable toy motor module that can be used with a variety of aquatic toys, however it specifically relates to geared motors and is again related only to single direction propulsion. U.S. Patent No. 4,406,085, issued Sep. 27, 1983 to T. Rhodes, shows a modular device for multiple toy vehicles. This concept discloses a removable radio receiver and motor control system, but does not accommo-

date the separation of the entire drive system from the body of the toy.

[0004] A wide variety of internally propelled waterfowl decoys have been developed over the years. Some of these devices are designed to simply propel the decoy in a straight or predetermined circular pattern. Others are specifically intended to replicate repetitive oscillating swimming or rotating wing motions which are switched on and off by a remote transmitter. Additionally, others, which are more in keeping with the present invention, are remotely propelled and steered through the water. The majority of these devices have been designed solely as radio controlled decoys, which are limited in their specificity, and are expensive and difficult to manufacture. U.S. Patent No. 3,689,927, issued Sept. 5, 1972 to R. Boston shows a decoy that has been designed to incorporate the drive and steering components permanently into the body of a decoy. This typically entails a removable section of the top of the decoy to access the enclosed electronics. As a result, this allows for possible environmental damage of the electronics and a difficult, labor intensive conversion of a standard decoy. U.S. Patent No. 5,377,439 issued Jan. 3, 1995 to R. Roos, and R. Roos Jr., shows an alternative de-

vice that also incorporates internal components specifically designed to provide a radio-controlled decoy. U.S. Patent No. 6,601,333 B2, issued Aug. 5, 2003 to G. Cicoff and M. Cicoff provides a game decoy with a removable operation system that includes propulsion and steering control. This, however, pertains solely to game decoys, includes additional devices intended to retrieve a downed bird, and does not provide a simple means to convert an existing game decoy into a radio controlled game decoy. In addition it does not provide for a self-contained unit that is specifically designed as a propulsion and steering device.

[0005] Other removable marine propulsion units exist which are intended to provide propulsion and steering to boats. U.S. Patent No. 5,131,875 issued Jul. 21, 1992 to W. Lee shows a dual motor propulsion and steering system mounted to a boat. U.S. Patent No. 6,132,267, issued Oct. 17, 2000, to J. Campbell shows a similar system that additionally employs a yoke to connect the drive motors over the top surface of a boat. U.S. Patent # 5,601,461 issued Feb. 11, 1997, to S. Mills shows a propulsion apparatus that is intended to mount to a float tube for fishing. U.S. Patent No. 6,000,978 issued Dec. 14, 1999, to C. Donahue shows a

propulsion device that can be mounted to a floatation board. These inventions, while being removable aquatic propulsion devices, do not employ the use of remote radio electronics in their designs. U.S. Patent No. 4,614,900 issued Sep. 30, 1986, to J. Young shows a remote controlled driving system for a boat. This device, while removable and radio controllable, relates specifically to externally mounted trolling motors, commonly used for fishing, and does not include all of the components to provide a self-contained radio controlled aquatic propulsion device.

[0006] According to the previously described inventions, it is an object of the present invention to provide a new and improved aquatic propulsion device.

[0007] It is another object of the present invention to provide a self-contained radio controlled aquatic propulsion device.

[0008] It is another object of the present invention to simplify the components of radio controlled aquatic toys, aquatic novelty items, waterfowl decoys and small boats.

[0009] It is another object of the present invention to provide an inexpensive set of radio controlled aquatic toys, aquatic novelty items, waterfowl decoys and small boats.

[0010] It is yet another object of the present invention to provide

a removable, self-contained radio control propulsion device, which may be used interchangeably with many aquatic toys, aquatic novelty items, waterfowl decoys and small boats.

SUMMARY OF INVENTION

[0011] According to the objects previously described, the general purpose of the invention will subsequently be disclosed in greater detail, according to the preferred embodiment of the present invention.

[0012] The advantages of the present invention are attained by a removable, self-contained radio controlled aquatic propulsion device, which can be used with a variety of buoyant objects. The components of the device include a watertight, hollow body, which contains a radio receiver circuit, an antenna, a motor control circuit, dual drive motors and batteries to provide power to the circuits and drive motors. The drive motors are contained in a watertight housing, or housings, and are permanently attached to the bottom of the device. A propeller is attached to the axle of each motor to provide thrust. The device also includes a switch to electrically disconnect the batteries from the circuitry and drive motors when the device is not in use. The device may include a charging jack to provide

power to recharge the batteries. The device may include a watertight plug to seal the charging jack. The device may include dual electrically conductive tabs on the exterior surface of the body, which are internally connected to the batteries. The device may include a charging cradle to provide power to recharge the batteries through the tabs when inserted into said charging cradle. A skeg may be attached to the bottom of the device to aid in controlling the motion of the device. A weight may be attached to the bottom of the device to aid in stabilizing the device.

[0013] The receiver generates signals to operate the motor drive circuit in response to command signals transmitted from a radio transmitter. The motor drive circuit controls the power to the drive motors.

[0014] A set of buoyant objects is also provided, each of which employs the device to provide radio control of the object. This may include toy boats and ships, waterfowl decoys, aquatic novelty items, and small boats. The bodies of the buoyant objects include a cavity designed to fit the device. The device is removably attached in the cavity by mechanical means, which may include, but is not restricted to tabs, clips, snaps, straps, rotating tab locks, or suction cups.

[0015] The device may include an electrically conductive contact on the exterior surface of the body, which is internally connected to the antenna. The cavity of the buoyant objects described above may include an electrically conductive contact which is designed to engage the contact connected to the antenna of the device when said device is inserted into said cavity. The contact on the cavity may be connected to a length of antenna wire housed in the body of the buoyant object. The connection of the two contacts and the extra antenna increases the overall length of the antenna in order to provide extended radio range of the device.

[0016] While the before mentioned buoyant objects may be manufactured with a cavity molded into the body of said buoyant object, a separate cavity insert is also provided. The insert may be permanently installed into the body of an existing buoyant object by means of, but not restricted to mechanical fasteners, adhesives, sealants or any combination of these. Where said existing buoyant objects are constructed with thin wall structures, uneven or warped surfaces, or are constructed out of materials that resist the effectiveness of adhesives or sealants, an internal ring or other structure may be employed to receive mechanical

fasteners, compress the insert onto the bottom of said buoyant object, compress the adhesive or sealant between the insert and buoyant, object or any combination of these to fixedly attach the inert into the body of the buoyant object.

[0017] Other objects, features and advantages of the invention will become apparent by reference to the detailed description of the invention, taken in conjunction with the drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0018] FIG. 1 is a perspective view of the radio controlled aquatic propulsion device as constructed in accordance with the preferred embodiment of the present invention.

[0019] FIG. 2 is a perspective view of a transmitter, which may be used to transmit control signals to the aquatic propulsion device of the present invention.

[0020] FIG. 3 is a fragmentary perspective view of the aquatic propulsion device as constructed in accordance with the preferred embodiment of the present invention, showing the various components of the device.

[0021] FIG. 4 is a schematic diagram illustrating the functional components of the propulsion device for the purpose of illustrating the relationships of said components.

- [0022] FIG. 5 is a side view of the propulsion device as constructed in accordance with the preferred embodiment of the present invention.
- [0023] FIG. 6 is a bottom view of the propulsion device as constructed in accordance with the preferred embodiment of the present invention.
- [0024] FIG. 7 is a rear view of the propulsion device as constructed in accordance with the preferred embodiment of the present invention.
- [0025] FIG. 8 is a perspective view of the present invention showing the process of inserting the device into a typical toy ship with a cavity molded into the body of the toy ship.
- [0026] FIG. 9 is a perspective view showing the process of inserting the device into a separate cavity insert, and an internal ring to attach the insert into a buoyant object that is not previously designed with an internal cavity to fit the present invention.
- [0027] FIG. 10 is a section view of a toy ship showing the process of inserting the preferred embodiment of the device into a molded-in cavity.
- [0028] FIG. 11 is a side view of a toy ship showing the propulsion device installed.
- [0029] FIG. 12 is a rear view of a toy ship showing the propulsion

device installed.

[0030] FIG. 13 is a section view of a game decoy showing the propulsion device installed, showing the use of a separate cavity insert, and an internal ring to attach the insert into the decoy.

[0031] FIG. 14 is a side view of a game decoy showing the propulsion device installed.

[0032] FIG. 15 is a perspective view showing the bottom of a game decoy with the propulsion device installed into the separate cavity insert.

[0033] FIG. 16 is a side view of the propulsion device showing a weight installed in the bottom of the device.

[0034] FIG. 17 is a perspective view of an aquatic novelty item with the propulsion device and the weight installed.

[0035] FIG. 18 is a side view of the propulsion device with a skeg installed in the bottom of the device.

[0036] FIG. 19 is a perspective view of the propulsion device showing the external charging contacts and the external antenna contact.

[0037] FIG. 20 is a side view of the cavity insert showing the antenna contact and the auxiliary antenna.

[0038] FIG. 21 is a perspective view of the charging cradle.

[0039] FIG. 22 is a perspective view of the propulsion device in-

stalled in the charging cradle.

DETAILED DESCRIPTION

[0040] For the purpose of clarity, as is well known to those skilled the art, the terms "watertight" and "sealed" shall imply that any bodies, enclosures, joints, connections or the such, are properly designed to resist water infiltration, by means of standard practices including, but not restricted to the use of sealants, adhesives, face seals, gaskets, o-rings, caps, plugs or any combination of these, or by any means necessary to provide reasonable resistance to the passage of water or other fluids. The term "permanently attached" or related terms, shall imply that any components that are connected in this manner are intended to be irremovable by a person using the device in its intended manner. This may be accomplished by means of various adhesives, or mechanical fasteners including but not restricted to screws, rivets, machine screws, welds, any combination of adhesives and mechanical fasteners, or any other means necessary to provide a permanent connection. Connections considered removable or disconnectable by a person using the device in its intended manner, may be created by, but are not restricted to tabs, clips, snaps, straps, rotating tab locks, suction

cups or any combination of these, or any means necessary to provide a connection of this type.

[0041] It is the intent of the inventor of the present invention to provide in detail the preferred embodiment of the present invention and various attachments and attributes; however, various changes may be made in the form, construction and arrangement of the invention without departing from the spirit and scope of the invention, and without sacrificing any of its advantages, it is to be understood that all matters are to be interpreted as illustrative and descriptive and not in a limiting sense.

[0042] Referring now to the preferred embodiment of the invention, FIG. 1 shows a radio controlled aquatic propulsion device 1 constructed in accordance with the present invention. The device includes a hollow main body, which consists of a top portion 2 and a bottom portion 20. Two drive motors 3 are contained in separate watertight housings 4 which are permanently attached to the bottom of the device. The main body consisting of the top portion 2 and the bottom portion 20 and the drive motor housing 4 may be formed of a moldable, high-impact plastic material. The drive motors 3 may alternatively be both housed in a single sealed motor housing (not shown), designed to

contain both drive motors 3, and permanently attached the bottom portion 20 of the main body of the propulsion device 1. As is well known to those skilled in the art, the dual motor configuration described above permits the control of both the speed and the direction of the propulsion device. Speed and directional control may also be accomplished by means of a single drive motor and rudder combination, or by a single rotationally controllable drive motor; however, these alternative constructions require the use of an internal rudder control servomechanism or an internal drive motor servomechanism which adds to the complexity of the preferred embodiment of the present invention. In addition these rotating additions to the main body of the propulsion device complicate or invalidate the object to provide a sealed main body of the propulsion device of the present invention. In addition, these components which would most probably be centrally located on the widthwise axis of the bottom of the main body of the propulsion device, may complicate the use of any additional attachments such as weights or a skeg that may be attached in this location. Therefore while these alternative constructions are possible, they are not the preferred embodiment of the present invention,

and therefore, will not be described in further detail in the detailed description or included in the figures of the preferred embodiment of the present invention.

[0043] FIG. 3 shows the internal components of the propulsion device 1 of the present invention enclosed by the main body, which include a circuit board 8 with a radio receiver circuit 10 and a motor control circuit 11. A receiver antenna 9 is connected to the receiver circuit 10. The body also contains batteries or a battery pack 12, a battery-disconnect switch 13 and a charge jack 14, which may be sealed by a plug 5 as shown in FIG. 1. The drive motor housings 4 are permanently attached to the bottom portion of the main body 20. A propeller 15 is attached to the axle of each drive motor 3. A protective cover 16 may be attached to the motor housing 4 to prevent personal injury of the operator by the propellers 15 and may also prevent damage to the propellers 15, and prevent debris from becoming entangled in the propellers 15. The operation of the propulsion device will be described later in the detailed description of the preferred embodiment of the present invention.

[0044] FIG. 8 shows a toy ship 26 that contains a molded-in cavity 22 designed to receive the preferred embodiment of

the propulsion device 1. The toy ship 26 may be formed of a moldable, high-impact plastic material. FIG. 10 illustrates the process of inserting and attaching the preferred embodiment of the propulsion device 1 in the body of a toy ship 26. The body of the propulsion device 1 includes a front protruding tab 17 that is inserted into a front tab receptacle 36 provided in the cavity 22 of the body of the toy ship 26. The rear end of the propulsion device 1 is subsequently rotated into the cavity of the toy ship 26. A protruding tab 18, provided on the rear end of the propulsion device 1, is retained by a retaining clip 25, which has been permanently attached or molded into the cavity 22. Once the propulsion device 1 has been properly inserted into the cavity 22, the majority of the propulsion device is safely concealed within the body of the toy ship. FIG. 11 shows a side view of the toy ship 26 with the propulsion device 1 inserted using the previously described process. Only the bottom portion of the propulsion device 20 and drive motor housings 4 with propellers and protective covers attached, if employed, and a small watertight switch 13 are visible as shown in the side view of the toy ship 26, and the rear view of the toy ship 26 as shown in FIG. 12. When the toy ship 26 is placed in the

water, only the upper body of the toy ship 26 is visible with no external antennas, other attachments, or access covers to distract from its overall appearance. It should be stated that the toy ship 26 described above is only a representation of any aquatic or buoyant object that contains a molded-in cavity designed to receive the preferred embodiment of the propulsion device 1 of the present invention.

[0045] The propulsion device may also be employed in various buoyant objects that are not easily manufactured with a molded-in cavity designed to receive the propulsion device. As is well known to those skilled in the art, inexpensive game decoys, for instance, are typically manufactured by means of rotationally molding a thermoplastic material. Such decoys are typically manufactured with thin-walled bodies in order to conserve material for lower cost to the consumer, and to provide lightweight decoys, which are commonly carried into the field by hunters or game researchers. As is well known to those skilled in the art, the process of manufacturing so called "roto-molded" structures provides only a hollow watertight shell, which has limited, or no means to provide internal attachment provisions, which could be employed to permanently install the

mechanical devices and electronics used to provide a radio controlled decoy. The process of altering a plastic decoy manufactured using the "roto-molded" process would typically employ cutting an access hole in the top of the decoy to install the appropriate mechanical devices and electronics. In addition, the "roto-molding" process typically employs the use of materials such as polyethylene thermoplastic, which is relatively inexpensive and highly impact resistant; however, as is well known to those skilled in the art, this family of thermoplastics is extremely resistant to chemical bonding. Therefore, the process of altering a plastic decoy constructed using this material would be difficult and labor intensive. As such, the process of converting a typical plastic decoy into a radio controlled decoy has traditionally been cost prohibitive, and does not provide the end result intended by the present invention. As was provided in the detailed description of the toy ship 26, a molded-in cavity may be provided in the body of a game decoy to receive the propulsion device, however it is well known to those skilled in the art, that "roto-molding" does not typically provide dimensionally consistent plastic bodies that would be properly suited to employ the preferred embodiment of

the present invention. More dimensionally consistent decoy bodies could be manufactured to provide a molded in recess designed to receive the radio controlled propulsion device 1 of the present invention, using a process such as injection-molding thermoplastic, however the tooling for such a design would again be highly cost prohibitive, considering that the highly specific design of a radio controlled game decoy may have limited marketability. In addition, for each type of game decoy produced, an entirely new set of tooling would have to be built. This would greatly add to the cost of providing a broad range of radio controlled game decoys. Accordingly the present invention provides a much more cost effective and thereby commercially viable means for providing a broad range of radio controlled game decoys, using existing game decoys or by utilizing or slightly altering the pre-existing practices of inexpensively manufacturing extremely life-like game decoys. The decoy example also applies to any buoyant object, hollow or otherwise, constructed using any manufacturing process that does not provide a molded-in recess designed to receive the propulsion device 1 of the present invention.

[0046] FIG. 9 shows simple means to insert the propulsion device

1 into a game decoy, or other existing aquatic objects not manufactured with a molded-in cavity designed to receive the propulsion device 1 as previously described in the toy ship 26, or other objects with a molded-in cavity designed to receive the aquatic propulsion device 1 of the present invention. A separate cavity insert 24 is provided to receive the propulsion device 1. The cavity insert 24 may be used as an alternative means to provide the appropriate cavity structure to receive the propulsion device 1. The cavity insert 24 is permanently mounted into the bottom of a plastic decoy 27 as illustrated in Figs. 13–15. A perimeter flange 39 may be provided around the lower portion of the cavity insert 24 to provide for a sealant or adhesive to be applied between the decoy and the cavity insert 24. The flange 39 also provides a location through which mechanical fasteners may be used to aid in the permanent attachment of the cavity insert 24 into the body of the decoy 27. FIG. 9 also shows an internal ring 23 that may be utilized in this process. Many game decoys and other buoyant objects that may utilize a cavity insert, such as the one previously described, are constructed with walls that are too thin to properly hold mechanical fasteners. These objects, including but not restricted to a game

decoy 27, may be constructed using materials that are either too brittle or too soft to properly employ the use of mechanical fasteners. Accordingly, in order to permanently attach the cavity insert 24 with many different buoyant objects and decoys, an internal ring 23 may be provided to better employ the use of mechanical fasteners. The internal ring 23 may have a pattern of holes designed to receive screws, rivets or the such, that are fastened from the flange 39 of the cavity insert 24, through the bottom surface of the decoy 27 or other buoyant object, and into the internal ring 23 by which they can be permanently fastened. The internal ring 23 may also be constructed with other attachments such as screw nuts, or molded-in inserts to aid in permanently attaching the internal ring 23 through the body of the decoy 27 or other buoyant objects to the cavity insert 24. FIG. 13 shows the cavity insert 24 permanently attached into the bottom of the decoy 27 with the propulsion device 1 installed in the cavity insert 24 with the front protruding tab 17 inserted into a front tab receptacle 36 provided in the cavity 22 of the cavity insert 24. In the same manner described with the toy ship 26, the rear end of the propulsion device 1 is subsequently rotated into the cavity 22 provided by the

cavity insert 24. The protruding tab 18 provided on the rear end of the propulsion device 1 is retained by a retaining clip 25, which has been permanently attached to or molded into the cavity insert 24. After the propulsion device 1 has been properly inserted into the cavity 22 of the cavity insert 24, which has been permanently attached to the bottom of the decoy 27, the majority of the propulsion device 1 is safely concealed within the body of the decoy 27. FIG. 14 shows a side view of the decoy 27 with the propulsion device inserted using the previously described process. Only the bottom portion of the propulsion device 20 and drive motor housings 4 with propellers 15 and protective covers 16 attached, and a small watertight switch 13 are visible which creates a somewhat lifelike appearance of an actual game bird having feet dangling in the water. When the decoy 27 is placed in the water, only the upper body of the decoy 27 is visible, with no external antennas, other attachments, or access covers to distract from the overall appearance of a life-like game decoy, which to those skilled in the art is a primary concern of game decoys. The cavity 22 and propulsion device 1 may also be constructed in such a manner that only the drive motors housings 4 propellers 15 and protective covers 16,

if employed, are visible after the propulsion device has been properly inserted into the decoy 27. This could be attained by altering the shape of the main body of the propulsion device 1, and accordingly altering the shape of the cavity designed to receive said propulsion device 1. This modification also applies to buoyant objects with a molded-in cavity 22 previously described in the example of the toy ship 26.

[0047] Referring now to the propulsion device and the various components previously detailed in FIG. 3, the operation of the preferred embodiment of the propulsion device 1 will now be disclosed. In order to provide radio control to the propulsion device 1, a transmitter 6 shown in FIG. 2, controlled by the operator, generates control signals, which are transmitted by means of a transmitting antenna 7. The transmitter may provide dual toggle controls 37 such as those shown in FIG. 2. In the preferred embodiment of the present invention, the left toggle controls the left drive motor and the right toggle controls the right drive motor. Forward-to-back motion of both toggles is preferred to an alternative right-to-left motion in the left toggle, which is commonly employed in existing radio controlled boats and cars to control the turning motion of the vehi-

cle. Full motion control is attained by varying the positions of the toggles 37 with respect to each other, thereby affecting the thrust of the drive motors that will be described presently. As shown in FIG. 4, a receiver circuit 10 located within the main body of the propulsion device receives the signals transmitted by a transmitter, by means of a receiving antenna 9, and conditions the received signals in conjunction with the motor control circuit 11 for control of the drive motors 3. The motor control circuit 11 may be of a proportional type, allowing for adjustable motor speed and direction, or it may simply be designed to provide only motor direction control, with motor-on forward, motor-on reverse, and motor off control. The proportional variety is recommended for the preferred embodiment, because it provides better control of the propulsion device; however this type is more complicated and expensive to manufacture. Thus, the specific type of motor control used, is to be determined by the appropriate need for the propulsion device 1. While radio signals are the preferred means of communication between the transmitter 6 and receiver circuit 10, it should also be suggested, to those skilled in the art, that other remote transmission components may be used including, but not

limited to, infrared devices, and sonic or ultrasonic devices.

[0048] In continuation with the description of the preferred embodiment of the present invention, the drive motors each have a propeller 15 attached to the axle of the drive motor 3, which provides the appropriate thrust to propel the propulsion device 1 through the water. The device has a battery 12 or a combination of batteries to provide power to said circuits and drive motors 3. The propulsion device 1 also has a battery disconnect switch 13, which prevents battery consumption when the device is not in use. As shown in FIG. 15, the switch 13, in the preferred embodiment of the invention, is sealed, and located on the bottom portion of the device 20 so that it can be accessed without removing the propulsion device 1 from the buoyant object in which it has been inserted as previously described. As shown in FIG. 3, the batteries 12 in the preferred embodiment of the invention are also located in the bottom portion 20 of the main body of the propulsion device 1, in order to provide a lower center of gravity, to maximize stability when a buoyant object employs the propulsion device 1 in the previously described manner. It is suggested by the inventor that the preferred embodi-

ment of the present invention employ the use of rechargeable batteries that are permanently mounted in the main body of the propulsion device 1, in order to minimize the possibility of the water infiltration into the body of the propulsion device 1, that could be caused by the use of removable battery access covers or hatches. A charge jack 14 is provided in the body of the propulsion device 1 to allow recharging of said permanently mounted batteries 12. A sealing plug or cap 5 may be provided to seal the penetration created in the main body of the propulsion device by the charge jack 14. Any variations to this suggestion are completely within the scope of the present invention. Therefore, the implementation of removable rechargeable batteries, or removable disposable batteries, in the construction of the present invention, is also possible. The receiver antenna 9, in the preferred embodiment of the present invention, is located as high as possible in the top portion 2 of the main body of the propulsion device 1 in order to maximize operating range, and may be enclosed in a separate antenna compartment 19 as shown in FIG. 1, that is molded-in, or permanently attached to the body of the propulsion device 1.

[0049] The combined elements provided in the radio controlled

aquatic propulsion device 1, inserted and attached into the buoyant objects previously described, provides a wide variety of radio controlled objects including but not restricted to radio controlled toy boats or ships, radio controlled game decoys, radio controlled aquatic novelty items, and on a somewhat larger scale, radio controlled propulsion means for small boats that are designed to employ the propulsion device 1 in the manner provided by the preferred embodiment of the present invention.

[0050] A weight 28 shown in FIG. 16 may be externally attached to the bottom of the propulsion device 20 by means of a tab 21, or by other means, to additionally lower the center of gravity, when the propulsion device 1, is used in taller buoyant objects 29, such as the one shown in FIG. 17. Such taller buoyant objects 29 may be prone to tipping over in the water without the use of such additional weights, which would result in the complete loss of control of the propulsion device. In the same manner, an external skeg 30 as shown in FIG. 18, may be attached to the bottom 20 the propulsion device 1 to provide better tracking of the propulsion device 1, and various attached buoyant objects during use.

[0051] Other variations to the preferred embodiment of the

present invention may provide improved performance or ease of use of the propulsion device 1. FIG. 19 shows an external electrically conductive antenna contact 31 that may be permanently attached to the upper portion 2 of the propulsion device. The contact may be molded or mounted into the surface of the propulsion device 1, and is attached to the internal antenna 9 shown in FIG. 3. A second electrically conductive antenna contact 32, may be molded or mounted into the surface of the molded-in cavity 22, provided in the description of the toy ship 26, or in the cavity 22 of the cavity insert 24. An additional receiver antenna section 33 is connected to the contact 32 provided in the cavity 22. When the propulsion device 1 is inserted into the cavity 22, in the manner previously described, the contacts are conductively connected, providing a longer overall length to the receiver antenna 9. The increased length of the receiver antenna may provide increased operating range of the propulsion device 1. The additional receiver antenna 33 may be permanently enclosed in the body of a buoyant object such as the toy ship 26, or the decoy 27. The additional receiver antenna 33 is most effective in increasing the range of the propulsion device 1 if the end of said additional receiver antenna

33, is located in the highest portion of the buoyant object; for instance, in the head section of the body of the decoy 27.

[0052] The propulsion device 1 may also provide external charging contacts 30, which allow the internal batteries 12 of the propulsion device 1 to be recharged without the use of a charging jack 14, or in addition to said charging jack 14. FIG. 19 shows the external electrically conductive charging contacts 30 that may be permanently attached to the upper portion of the propulsion device 2. The contacts 30 may be molded or mounted into the surface of the propulsion device. One contact is connected to the positive terminal of the batteries 12, and the other contact is connected to the negative or ground terminal of the batteries 12. A charging cradle 34, such as the one shown in FIG. 21, may be used to recharge the internal batteries 12, by providing a second set of contacts 35 in the cradle, that supply the appropriate voltage to the internal batteries 12 by means of an external AC to DC transformer common with other household electronics. Means may also be provided by the charging cradle to recharge the internal batteries of the propulsion device 1 using other fully charged batteries such as a car battery, which may be

used to recharge the propulsion device 1 in the field, or in any location where standard household current is inaccessible. Fig. 22 shows the charging cradle 34 with the propulsion device 1 inserted, in the manner provided by the preferred embodiment of the present invention.

[0053] While the following invention has been disclosed, and a particular embodiment has been described in detail, it is not intended that the invention be limited solely to this embodiment. Many modifications will occur to those skilled in the art, which are fully within the spirit and scope of the invention.

[0054]